engineering (workshop practise and machine drawing); and one or two years training in the methods of research under a professor or teacher of a university or university institution who is competent to train in research. Sir P. C. Ray, who stands only second to Sir Jagadis Bose in eminence as an Indian scientist, in a dissentient note disapproves of the creation of yet another Indian service, and thinks the best results could be achieved by improving the teaching of chemistry in the universities. They should be encouraged to strengthen the staff of chemical teachers and to offer research scholarships. Technological institutes should be attached to each university as an adjunct to the chemical and physical departments.

The attractiveness *prima facie* to men of high scientific attainment of dependence on the universities has been shown in the last few months in the correspondence columns of *Nature*. In his introductory note to the report Dr. Thorpe, who may be presumed to have had strong leanings in the same direction when his inquiries began, is unhesitating in his conclusion that the development of chemical industries in India can only be adequately realized through the agency of an efficient Government Chemical Service. At the outset the report refers to the method, found satisfactory in England, of government subventions to research associations in the various branches of industry. But in India, with its comparatively undeveloped great natural resources, "a more intimate system of state assistance" is held to be necessary. Similarly, it is not possible at present to rely upon the Indian universities to complete the training necessary for appointment to the service, and selected students must be sent abroad under a system of maintenance agents.

It is pointed out that the formation of the service will necessitate a strengthening of the chemical departments of Indian universities and institutions. The professors of chemistry should be relieved of some of their routine work, and could then devote an appreciable amount of time to training their senior students in methods of research. The formation of a service for the purpose of industrial research does not mean that university professors should be discouraged from doing similar work. Dr. Thorpe, in his introductory note, says that while it is impossible and unnecessary to have laboratories attached to the universities fitted with full-scale apparatus, there should be attached to the chemical department in every university a laboratory of comparatively small dimensions, containing types of every kind of plant used in chemical manufacture of about one sixtieth the size of the large scale plant.

The proposed Chemical Service touches the educational service or educational institutions directly only in so far as concerns the efficient training of its recruits in research methods. For this reason it is not proposed that professors and teachers of chemistry should normally be members of the service. It would be open to the Education Department or to an educational institution to ask for a chemist to be seconded from the service if it so desires. Such chemists would retain their lien on their appointment in the Chemical Service, and could revert thereto on promotion, on their own request, or on the request of the authorities to whom their services had been lent.

NORTH AMERICAN FOREST RESEARCH

The National Research Council reports that it has published a complete summary of all of the scientific investigations upon forest problems which are now under way in the United States and in Canada as a bulletin upon "North American Forest Research." This bulletin was compiled by a committee of the Society of American Foresters composed of:

Earl H. Clapp, assistant forester, U. S. Forest Service.

Clyde Leavitt, commissioner of conservation of Canada, Ottawa.

Walter Mulford, professor of forestry, University of California.

J. W. Toumey, director of the forest school, Yale University.

E. A. Ziegler, director, State Forest Academy, Mount Alto, Penn.

In this bulletin 519 different projects for investigation are described, including the re-

forestation of cut-over areas, the replacement of timber cuttings by natural growth, the control of insect pests and fungus diseases of forest trees, beneficial modifications of lumbering practise, the preservation of timber in use, the utilization of by-products, and the relation of forestry to rainfall, control of flood waters, grazing, etc.

The importance of the most penetrating study upon the conservation of our remaining forest resources is brought home by the recent announcement of the Forest Service that "three fifths of the original timber of the United States is gone and that we are using timber four times as fast as we are growing it." Our annual consumption of lumber alone is over 300 board feet per capita, and of newsprint is 33 pounds per capita. Cut and burned over forest lands in the United States, now waste territory, equal in area the whole of the present standing forests of Denmark, Germany, Holland, Belgium, France, Switzerland, Spain and Portugal. The total population of these countries is about 152,200,000, nearly 50 per cent. greater than the population of the United States.

OFFICE OF DEVELOPMENT WORK

COMMERCIAL and industrial concerns will be helped to apply new processes and discoveries of chemists in the United States Department of Agriculture by an Office of Development Work just created by the Secretary of Agriculture in the Bureau of Chemistry. The staff of the new service will be made up of engineers rather than chemists. David J. Price, chief engineer in the dust-explosion investigations conducted by the department, will be in charge of the new work.

Dr. Carl L. Alsberg, chief of the Bureau of Chemistry, in a letter to the secretary stated that such a service is urgently needed to translate the work of the bureau into terms that could be understood and applied by the manufacturer and investor. Every year valuable discoveries are made concerning the utilization of manufacturing waste, or a new food is found, or a new dye, glue, or preservative. Without the service of a business office such as is now provided the value of these discoveries is greatly reduced through the discoverers's inability to present his proposition in terms which the business man can understand, and the public runs the risk of losing a much-needed material. Under the new organization the engineers will look after the product as soon as it has passed beyond an experimental or laboratory stage and will prepare estimates for the convenience of the manufacturers.

Mr. Price and his associates will furnish data upon raw-material supply, cost of production, and the uses to which the product is adapted—in short, they provide an unbiased practical prospectus to show the public exactly what may be expected from the new material or process on a quantity-production scale. It is believed this cooperation will develop many neglected sources of public and private profit.

SCIENTIFIC NOTES AND NEWS

PROFESSOR GEORGE M. STEWART, director of the H. K. Cushing Laboratory of Experimental Medicine of Western Reserve University, had conferred on him the degree of doctor of laws at the recent commencement exercises of the University of Edinburgh.

THE honorary fellowship of the Royal College of Surgeons of England has been conferred on Professor A. Depage, of Brussels; M. Pierre Duval, of Paris; Prof. John M. T. Finney, of The Johns Hopkins University, Baltimore, and Dr. Charles H. Mayo, of Rochester, Minnesota.

THE University of Ottawa has conferred the degree of doctor of literature on Dr. J. C. McWalter, high sheriff of Dublin, and president of the Dublin Branch of the British Medical Association.

BARON GERARD DE GEER, of Stockholm, has arrived in this country to study the geological chronology since the ice age in the United States and Canada. He is accompanied by his wife and Drs. Ernest Antevs, and Ragnar Lidén.

DR. N. L. BRITTON, director of the New York Botanical Garden, accompanied by Mrs. Brit-